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Comparison of students' learning achievements in the subject of mathematics taught by trained teachers and untrained teachers at primary level

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Abstract

Teacher training programs are the initiatives to enhance teachers' competencies and develop their skill to teach effectively and create learning environment in which students feel free and satisfied to learn and cooperate with the teacher. The main purpose of the study was to find out the impact of in-service training imparted to primary school teachers in the subject of mathematics. 48 primary schools were taken as sample from Faisalabad. Among these, teachers of 24 schools were imparted in-service training and others were not. 35 students were taken as sample from each school. An achievement test was constructed as research tool and validated through pilot testing by determining difficulty level, discrimination index and reliability. Test was further divided into 11 dimensions (i.e) conceptual understanding, procedural knowledge, problem solving, logical part, number sense properties & operations, factors & multiples, fractions, measurement, geometry, information handling and over all. After getting the achievement test from the students test was marked and tabulated. SPSS XII was used for data analysis. Independent sample t-test was used to find out whether there existed a significant difference between the achievements of the two groups. The study reveals that the students who were taught by the trained teachers are significantly better than those taught by untrained teachers on conceptual understanding, procedural knowledge, problem solving, number sense properties & operations, factors & multiples, fractions, measurement, geometry and over all. On the other hand, there was no significant difference on logical part and information handling. On the basis of this study, some recommendations were made to improve teacher training programs at primary level.

Keywords: Teacher training; in-service teacher training; PSTs; mathematics; learning achievement; achievement test.

1. Introduction

Education is an intellectual activity to change the behavior and develop potentialities of individuals. It is a source to change social, economical and cultural setup of the societies. Individuals acquire education by formal and

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informal system of education. Formal system of education is a structured system where teachers play important role. The role of the teacher in this development and change is imperative and the teacher remains the single most important school- based factor related to students' learning. Effective learning is the result of effective teaching. Many other factors like class size, teachers' knowledge and qualification, teachers' training and other school variables play vital role in students' learning achievement especially in Mathematics because teaching Mathematics is the field in which knowledge of the subject matter is first necessity. However teaching mathematics according to Mayor (2005), involves more than knowing and enjoying the subject. Teachers must be able to adopt strategies to motivate the students for learning in this subject keeping in view the applicability of the subject in real life situations. For this purpose, teachers' professional development is required because quality of learning depends on the quality of instruction provided by the teachers in classroom. How teachers learn and develop is a question that has compelled teacher educators and researchers to think about it. Teacher training programs are the initiatives to enhance teachers' competencies and develop their skill to teach effectively and create learning environment in which students feel free and satisfied to learn and cooperate with the teacher. Along with providing training to the teachers, it is also important to judge their effectiveness in the field. Teachers cannot be expected to do all this on their own. They need support and the certain environment for the purpose (Banks, 2007).

Different institutions play their role in different time at district and national level to train the teachers before starting their jobs and during job. Directorate of Staff Development (DSD), Punjab, Pakistan, is one of them fulfilling this responsibility. It aims at imparting the fundamentals of teachers' education with a view to qualify the trainee for the immediate employment in a school or to provide the basis for 'Specialization' in different subjects. The overall mandate of the DSD is to enhance the professional capacity of teachers, head teachers, teacher educators, and various categories of education personnel whose work affects the quality of learning in schools directly or indirectly. Its target population consists of Primary School Teachers (PSTs), Elementary School teachers (ESTs), Secondary School Teachers (SSTs), Higher Secondary School Teachers (HSSTs), Head Teachers (HTs) or Head Designates (HDs) and/or District Education (DE) staff (DSD, 2006). It is believed that if the teaching-learning process is organized properly, all students will learn what is taught. Low level of student achievement indicates inadequacy/inefficiency of the teaching-learning process. At the school level, examination is used to assess the success. Proper analysis of examination data helps in diagnosing factors responsible for poor performance of students and indicates possible remedies. Evaluation of student achievement has all along been an integral part of the teaching learning process. Many researches have been conducted in this field on different programs to evaluate their effectiveness at different levels. This research is also an effort to study the effectiveness of an in - service teachers' training in the subject of Mathematics at primary level in Pakistan.

1.1. Objectives of the Study

The objectives of this study were:

- To review the teacher training programs of DSD in Pakistan
- To compare the learning achievements of students in the subject of mathematics taught by trained teachers and untrained teachers
- To suggest measures for the improvement of training programs at primary level.

1.2. Significance of the Study

This study will be:

- Helpful to find out the difference between trained and untrained teachers regarding their effectiveness of teaching in Mathematics
- Useful for primary school teachers to improve their teaching in Mathematics
- An important effort to help teacher training agencies and institutions

1.3. Delimitations of the Study

The study was delimited to:

- Primary schools' untrained teachers and trained teachers by DSD, being supervised by District teacher educators (DTEs) DSD.
- Study was conducted in primary schools of District Faisalabad only.

1.4. Procedure of the Study

The study was quantitative in nature. All public primary schools, students of grade-5 in district Faisalabad constituted the population of the study. Untrained teachers and DSD Trained teachers teaching Mathematics to grade-4 were the sample of this study. The respective students of these trained and untrained teachers who had passed their 4th grade examination were focused. 48 schools from district Faisalabad were selected conveniently; 16 schools from each tehsil. 35 students of grade-5 from each school were the sample of this study. Achievement test in the subject of Mathematics for grade -4 students were designed and administered to the students. Collected data were analyzed by using SPSS- XII.

2. Findings

Table : 1 Showing the difference in the achievements of the students in different dimensions taught by trained and untrained teachers

Dimension	Category of Teacher	N	Mean	Std. Deviation	Std. Error Mean	t-value	p-value
Conceptual understanding	Trained	527	6.0	3.2 30	.1418	5.406	0.000
	Un Trained	642	5.040	2 0406	.1067		
Procedural knowledge	Trained	527	4.	3.02924	.1319	4.273	0.000
	Un Trained	642	3.369	2.25569	.0890		
Problem solving	Trained	27	3.149	2.54882	.1110	2.196	0.028
	Un Trained		2.864	1.71222	.0675		
Logical	Trained	527	2.148	1.52947	.0666	1.577	0.115
	Un Trained	642	2.023	1.07637	.0424		

It is evident from the table above (table 1) that the mean score of trained teachers is greater than the mean score of untrained teachers and p-value is less than .05 significant level regarding developing conceptual understanding, Procedural knowledge and Problem solving abilities of students in the subject of Mathematics. It can be said that trained teachers are significantly better than untrained teachers on the parameters mentioned above but no significant difference was found between trained and untrained teachers on developing logical abilities of the students because the p-value is greater than .05 significant level.

Table 2. Showing the difference in the achievements of the students in different dimensions taught by trained and untrained teachers

Dimension	Category of Teacher	N	Mean	Std. Deviation	Std. Error Mean	t-value	p-value
Number sense properties and operations	Trained	527	4.595	2.77445	.1208	3.977	.000
	Un Trained	642	3.9891	2.35828	.09307		
Factors and multiple	Trained	527	1.189	1.35309	.0589	[illegible]	.000
	Un Trained	642	.9299	1.11984	.0442		
Fractions	Trained	527	2.557	2.52591	.1100	[illegible].753	.000
	Un Trained	642	2.073	1.71329	[illegible]676		
Measurement	Trained	527	2.324	1.02025	.0444	4.090	.000
	Un Trained	642	2.091	.898[illegible]	[illegible]54		
Geometry	Trained	527	1.965	[illegible]37839	[illegible]600	3.673	.000
	Un Trained	642	1.685	1.19[illegible]9	.0471		
data analysis, statistics, probability, information handling	Trained	527	.5655	.71578	.0311	1.627	.104
	Un Trained	642	[illegible]47	.52174	.0205		
overall including logical part	Trained	527	[illegible]34	9.1[illegible]19	.4006	4.412	.000
	Un Trained	642	13.2[illegible]	[illegible]5.3828	.2351		

The table above (table.2) states that the mean score of trained teachers is greater than the mean score of untrained teachers and p-value is less than significant level on Number sense properties and operations, Factors and multiple, Fractions, Measurement, Geometry, and overall including logical part except data analysis, statistics, probability, information handling. It can be stated that trained teachers are significantly better than untrained teachers in their performance in mathematics.

3. Discussion

Teacher education is considered a very significant investment for improving the quality of education in the society. Teacher education is not teaching the teacher 'how to teach'. It is to kindle his initiative, to keep it alive, to minimize the evil of the "hit and miss" (Aggarwal, 2000). If we want our teachers to transmit knowledge or information to the children then the focus on content knowledge is sufficient but if the teachers need to be able to ensure effective and successful learning for the learners who are having different types of background and prior knowledge and they learn in different ways. This teaching is more than the transformation of knowledge and information and requires in-service training of teachers (Chatterjee, 2007). In-service training programs particularly enable the employees to improve their skills and qualification related to the employment (Ashraf, 2004). No doubt Pakistan is confronting dual challenges of quantitative expansion and qualitative improvement like many other developing countries but it is also necessary to use the resources effectively and effective learning can be the result of not only effective teaching of the teachers but also effective schooling (AEPAM, 2002). Many studies have been conducted at national and international level in pakistan to check the effectiveness of teacher training programs. These studies indicate that training programs do effect teachers performance in their actual setting and trained teachers perform well in their particular field after training as compared to untrained teachers. This study also indicates that trained teachers are significantly better than untrained teachers teaching mathematic to the students at primary level because their mean score is greater than untrained teachers except developing logical abilities of the students and data analysis, statistics, probability, information handling, where study could not find and difference between trained and untrained teachers.

4. Conclusions

- Trained teachers are significantly better than untrained teacher on: conceptual understanding, procedural knowledge, problem solving, number sense properties and operations, factors and multiples, fractions, measurement and geometry.
- No significant difference was found on two parameters; logical part and data analysis, statistics, probability, information handling.
- Overall trained teachers are significantly better than untrained teachers in teaching mathemati
- Training does affect teachers' performance in their particular area of teaching.

5. Recommendations

- Trained teachers need further training in: Data analysis, statistics, probabili and inf mation handling along with developing logical ability of the students.
- Teachers should be provided with skills to keep the students away from te memo zation.
- Teachers' assessment should be made possible on the same basis a s dents to fi t weak areas on their part.
- Further research should be conducted to find out the reason of l w achieve nt level of students in the weak areas.

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